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CERTIFIED MAIL-RECEIPT REQUESTED

June 25, 2007

Mr. Tim Eastep
Chino Mines Company
P.O. Box 7
Hurley, New Mexico 88043

Re: Response to Chino Mines Company's (Chino) Comments on the Human Health Risk Assessment (HHRA) For The Hanover and Whitewater Creeks Investigation Unit (HWCIU), Chino AOC

Dear Mr. Belew:

The New Mexico Environment Department (NMED) received the above referenced comments on September 22, 2006. A review of the comments has been completed and several responses are provided.

The NMED does not believe Chino Mines Company's (Chino) comments provide sufficient justification for revising the overall approach for the HHRA

General Comments

General Comment No. 1.

There appears to be an overlap between HWCIU and the Smelter/Tailing Soils IU (STSIU). It is unclear how risk management decisions will be made with respect to separate evaluations that are being undertaken by NMED. For example, in Section 3.3.3, the text indicates that inhalation risk from exposure to windblown tailings will be addressed in Exposure Reach 2; however, this pathway is also an important component of the STSIU human health risk assessment. In addition to overlaps between the IUs, there appears to be an overlap between the Administrative Order on Consent (AOC) and Discharge Plan (DP) 214. For example, on page 73 and 210, Neptune indicates that data from James Canyon will be needed to evaluate exposure to swimming and fishing, yet data were collected from this area during the follow-up sampling event for the STSIU Phase I Remedial Investigation (RI) that occurred in July, 2006. Surface water data is routinely collected under DP 214 and thus it is being treated as an operational area, not a historic issue.



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Please clarify how surface water samples from James Canyon will be used in decision making under the AOC. Please clarify which IU will address James Canyon.

NMED Response.

There is some overlap between the STSIU risk assessment, the HWCUI risk assessment, and environmental sampling related to discharge plans. The reason for overlap between the two IUs is simply that the same sources (such as windblown tailings) may serve as exposure media for receptors related to both IUs. Risk management decisions related to such sources may be based on one or both assessments. There is no clear boundary between environmental data collected under discharge plans and IU sampling because there is no such boundary between contamination related to historical and present-day releases. For example, sediments accumulating in the James Canyon reservoir and shallow groundwater in the HWCUI may both reflect historical releases that pertain to the AOC. The risk assessment is used to identify potentially important exposure pathways and media, risk management activities may then be conducted under one or more programs.

General Comment 2.

A significant amount of energy appears to have been spent to evaluate the available data collected at the site that could potentially be used to support this risk assessment. However, the result of each analysis appears to be to rule out the use of the available datasets, even given results suggesting usability of the data. For example, even though statistical tests could not detect a significant difference between the pre-tailing-spill sample data and post-tailing-spill data, Neptune concluded that the post-tailing-spill data were likely elevated above the pre-spill data, but chose not to include the data in the estimate of exposure point concentrations (EPCs) due to small sample sizes and the uncertainty with respect to the dataset. It is unclear whether in the calculation of EPCs the samples representing excavated soil were removed from the dataset (page 64). In addition, data from the tin can operation removal and Bayard yards were not included in the estimation of EPCs; however, these datasets would expand the distribution and add more detail to the evaluation of risk. Similarly, on page 67, the text indicates that data were not collected from visually affected upland areas of the Side Channel; however, there are active channel and terrace samples that could be used to evaluate a recreator.

NMED Response.

A review of the post-spill samples revealed that the results would not have changed any of the conclusions of the HHRA, aside from increasing uncertainties with respect to the data set itself. The comparison between pre- and post-tailings sampling suggest post-spill metal concentrations in E2 were elevated, but the significance of the difference cannot be quantitatively defined because of small post-spill sample sizes. Data adequacy evaluations generally indicated that the Phase I sediment data from bars and overbanks were appropriate only for representing exposure concentrations over a broad area. The relatively high degree of variability in metals concentrations within and among these geomorphic features does not support the use of existing data to represent exposure concentrations for chronic exposure pathways that might be limited in spatial scale to individual features or portions thereof. The decision to limit forward risk calculations to recreational and trespasser exposure scenarios, and borrowing fill from the active channel, was made in part because the primary goals of the Phase I risk assessment were to identify data gaps and support planning activities for a second phase of data collection. These

goals were achieved for the remaining exposure scenarios by plotting the Phase I data relative to risk-based preliminary remediation goals and background concentrations, thereby avoiding the calculation of exposure concentrations for localized exposures with the Phase I data.

General Comment 3.

The process and criteria for the selection of constituents of potential concern (COPC) is not clearly described in the text, and seems to be subjective. It appears that the seven COPCs that are detected in at least one exposure reach at concentrations greater than corresponding risk-based screening levels (RBSLs) were selected, and cadmium was added because concentrations were "very close" to the RBSLs. If RBSLs are not sufficiently protective for screening purposes that concentrations "very close" to them need to be included, then the RBSLs should not be used to screen for COPCs. Also, Chino recommends that statistical comparison to background concentrations be used to select COPCs (see No. 4 below).

NMED Response.

The identification of COPCs based on comparison to RBSLs was performed in Neptune's 2004 technical memorandum, which is summarized in Section 2.5 of the risk assessment. The decision to add cadmium (a suspected human carcinogen) to the original seven COPCs, noted in Section 3.4.3 of the risk assessment, was a decision that reflects a balance between limiting the number of key analytes to focus the risk assessment and including all analytes that might have a significant contribution to health effects in some area. EPA classifies cadmium as a probable human carcinogen with a classification of "B1".

As discussed in Section 3.4.2.1 of the risk assessment, the use of background comparisons to identify COPCs in the Phase I risk assessment was considered inappropriate in E2 and E3 due to the small sample sizes in these areas. As shown in Table 3-3, the only metals identified as being present at concentrations consistent with background in E1 were chromium and iron in overbanks. These two metals were nevertheless identified as exceeding background levels in the active channel and bars. For E1, presentation of total and background levels of risk for all COPCs was judged to be preferable to differentiating COPCs based on background comparisons when only 2 of 24 combinations of analyte and geomorphic feature were affected.

General Comment 4.

A background screening evaluation was conducted based on the 95 percent upper confidence limit (UCL) on the mean concentration; however, metal concentrations that exceed this value may still be within the range of background. It would be more appropriate to conduct statistical comparisons to background or to choose a value that represents the high end of the background distribution such as the upper tolerance limit (UTL) or upper predictive limit (UPL).

NMED Response.

Background comparisons are discussed in Section 3.4.2 of the HHRA. The method, as explained in this section, involves a weight-of-evidence approach combining visual inspection of boxplots with the results of several statistical tests (two-sample *t*-test, wilcoxon rank sum test, quantile test, and slippage test). The tests compare the centers and the right-tails of the site and background data. Risk assessment calculations were also conducted using the mean background concentrations.

General Comment 5.

Given the preliminary nature of this HHRA, the development and inclusion of PRGs may be premature. It appears the PRGs are the same as RBSLs that were previously reported by NMED in the Phase I Risk Analysis (Neptune, 2004). Chino does not support the inclusion of the food stuff pathways in RBSLs or PRGs because there is too much uncertainty surrounding key assumptions underlying the estimate of intake for these pathways.

NMED Response.

The PRGs employed in the risk assessment are not identical to the RBSLs presented in Neptune (2004). As described in the response to General Comment 2, the use of PRGs in the risk assessment is to provide a risk-based metric for evaluating the Phase I environmental data for exposure scenarios that apply to a small spatial scale. The PRGs are calculated according to the equations and inputs defined in Sections 3 and 4 of the risk assessment and are not intended to represent preliminary remedial action criteria or other such targets. NMED understands Chino's position on the food stuff pathway, however, NMED has previously stated that this pathway will be carried forward.

Specific Comments

Specific Comment 1.

Section 2.3.5.1 (page 17). The text should cite the Human Health Risk Assessment Workplan (Neptune, 1999) as the basis for the hypotheses that were included and implemented in the Phase I RI (Golder, 2000).

NMED Response.

The Human Health Risk Assessment Work Plan will be cited as the origin of the hypotheses in the Draft Final Phase I HHRA report.

Specific Comment 2.

Section 2.4 (page 21). It is not clear why the 95 UCLs had to be re-calculated. Having a higher value in this context is actually appropriate (see Comment No. 4 above).

NMED Response.

As explained in Section 2.4, the sediment background UCLs in Table 7.0-1 of GAI (2004a) were labeled as 95% UCLs, but were actually 97.5% UCLs. Sediment background summary statistics (Table 2.9) were reproduced for informational purposes and actual 95% UCLs were computed for the table.

Specific Comment 3.

Section 3.3. Ingestion of precipitate is included in the uncertainty section. Chino suggests that the uncertainty section also indicate that precipitate was observed during winter months (e.g., January) while exposure is assumed to occur during warmer months. Chino does not believe the ingestion of precipitate is a complete exposure pathway

NMED Response.

Evaporite and precipitate are discussed in Section 2.2 of the HHRA and, in the context of exposure media, under the heading of surface water in Section 3.2. The HHRA does not assess regular exposure to these materials because a complete exposure pathway for chronic exposure is indeed unlikely. However, this does not imply that exposure may never occur, only that it is unlikely to occur on a regular basis. The HHRA recognizes that the high concentrations of specific metals (eg. copper at 50,000 mg/kg) in evaporite and precipitate may present an acute health risk for a single exposure event.

Specific Comment 4.

Section 3.4.2 (page 59). It is not clear why Phase I RI sediment data for E2 was compared to E3 background data and not E1 background data. Also, if the E3 data are not appropriate for comparisons with the Side Channel and LWWC data, then why are these shown on boxplots?

NMED Response.

E3 background data, rather than data from E1, were applied in E2 because they are a protective representation of potential background concentrations in this area. As noted in the last paragraph of Section 3.4.2.1, the presentation of the E3 background data in the boxplots for the Side Channel and LWWC data was to provide some point of reference for approximate background values in these areas in lieu of statistical comparisons.

Specific Comment 5.

Section 3.4.2 (page 59). The Phase I Risk Analysis (Neptune 2004) presented the COPC selection based on comparing metals concentrations with risk-based screening levels (RBSLs) but background concentrations were not available. Chino requests that background be considered in the selection of COPCs.

NMED Response.

As discussed in Section 3.4.2.1 of the risk assessment, the use of background comparisons to identify COPCs in the Phase I risk assessment was considered inappropriate in E2 and E3 due to the small sample sizes in these areas. As shown in Table 3-3, the only metals identified as being present at concentrations consistent with background in E1 were chromium and iron in overbanks. These two metals were nevertheless identified as exceeding background levels in the active channel and bars. For E1, presentation of total and background levels of risk for all COPCs was judged to be preferable to differentiating COPCs based on background comparisons when only 2 of 24 combinations of analyte and geomorphic feature were affected.

Specific Comment 6.

Section 3.4.3 (page 61). Seven COPCs were identified in the technical memo based on a comparison to RBSLs. However, in this analysis, even though the maximum detected concentration of cadmium was less than each RBSL, it was included as a COPC, because it was "very close" to its respective RBSL. The RBSLs are extremely conservative and, therefore, if metals concentrations are below their respective RBSL, they should be eliminated as COPCs. There should be no need to include metals that are "close" to the RBSLs. Further rationale should be provided for cadmium if Neptune believes that the maximum detected concentrations have not yet been identified as well as a discussion of background concentrations.

NMED Response.

As noted in the response to General Comment 3, the purpose of the RBSL comparisons is simply to focus the baseline risk assessment on analytes that might have a significant contribution to health effects in some exposure area. By definition, a maximum detected concentration is a function of the existing data so a higher value is certainly possible with the collection of additional data. To the extent that there is some uncertainty regarding the possible importance of cadmium in one or more exposure areas or geomorphic features following Phase I data collection, it is defensible to retain cadmium as a COPC.

Specific Comment 7.

Section 3.4.3.1 (pages 62 – 63). Off-site residential scenario: Chino recommends that EPCs for this scenario not be estimated for P1 because of the steep terrain and difficulty for the exposure pathway to be complete given topography and slope.

NMED Response.

The feasibility of the off-site residential scenario being complete in any P-reach is related only to whether someone can access stream sediments with a vehicle in order to transport them to a remote location. There are a number of locations within P1 where this has occurred.

Specific Comment 8.

Section 3.4.3.2 (page 67). Side Channel: the text indicates that Phase I data were not collected from visually affected upland areas of the Side Channel and therefore recreational EPCs could not be calculated. However, earlier, on page 66, the text indicates that Side Channel samples could be grouped into active channel and terrace (overbanks outside the visually affected area), but that the terrace samples would be grouped with active channel for the purpose of developing EPCs. It seems that worse-case data have been collected from the side channel and that these data could be used to estimate recreational EPCs and thus it is unclear what is meant on page 67 that Phase I data were not collected from visually affected upland areas.

NMED Response.

The text on page 66 is referring specifically to the calculation of Side Channel EPCs for the active channel geomorphic feature. Sediment samples from the Side Channel include active channel composites and samples from overbanks outside of the visually affected area. Samples of visually affected areas (where vegetation growth is visibly impaired) were not obtained in Phase I. It is not clear that existing Side Channel samples in fact represent “worse-case” conditions with respect to sediment metal concentrations.

Specific Comment 9.

Section 3.4.4.1 (page 69). Chino suggests that cobalt and nickel not be included in the analytical plots since they are not considered COPCs.

NMED Response.

COPCs for the HHRA have been defined solely on the basis of sediment data and sediment exposure pathways. For shallow groundwater, the spatial and temporal patterns of cobalt and nickel concentrations in the monitoring well data are informative of the adequacy of the groundwater data for supporting calculation of EPCs for the risk assessment.

Specific Comment 10.

Section 3.4.4.2 (page 71). It is not clear how the summer rainfall pools data are to be used in the HHRA.

a. The text indicates that children may be exposed during storm flow events; however, storm flows in the area are a safety hazard and children are not routinely exposed because of danger of drowning due to flash flooding.

b. The risk assessment proposes not to quantitatively evaluate surface water but relies upon Table 4.4-38 in the Phase I RI Report (Golder, 2000) which is a comparison of surface water concentrations against New Mexico Water Quality Control (NMWQC) standards (page 72). These standards are protective of fisheries, not human health and thus Table 3-9 and the text in this section should be revised to be more applicable to human health.

c. The text indicates that "several constituents have flood flow concentrations greater to or higher than base flow concentrations". This is counterintuitive since surface water under flood flow should be more diluted than base flow. This would be the case if metals were due solely to influx from groundwater seeps; however, it is unclear at this time if flood flow may carry suspended sediments and metals which would be a cause for flood flow to have higher concentrations. The DP-526 samples were unfiltered and thus represent both total and dissolved concentrations which captures concentrations associated with suspended solids.

d. Studies proposed for Site-wide Abatement (DP-1340) may address these issues.

NMED Response.

Though children are not routinely exposed to storm flow events, the pathway will be assessed and the associated uncertainties will be addressed.

The discussion of surface water data adequacy is mostly a summary and interpretation of the existing surface water data. A valid concern is expressed that the surface water standards shown in Table 3-9 may not be relevant to even occasional human exposures. More relevant criteria will be researched and used for the Draft Final Phase I HHRA report.

NMED agrees that flood flow exhibiting higher metals concentrations is counterintuitive; however the text does mention that flow conditions were "determined primarily from field notes and secondarily from daily precipitation records". If precipitation greater than 0.5 inches was recorded at the Santa Rita weather station within a day or two of the sample collection date, then the sample was considered to represent flood flow.

The Chino site-wide groundwater abatement effort may address these issues in due course, however, the AOC must characterize the associated risks.

Specific Comment 11.

Section 3.5.1 (page 74). It appears that data from the Background Report (CMC, 1995) were not included in the development of EPCs. However, this may simply be a typo or terminology issue. The paragraph listing the data sources includes "Background Investigation (June 1995)," and then the next paragraph says that data relating to the Background Investigation was not included. If the data from the Background Report (CMC, 1995) was excluded from EPC development, please provide additional rationale for the exclusion. If the data was included in EPC development, please clarify the text in this paragraph.

NMED Response.

Data from the 1995 Background Report were not used in the calculation of sediment EPCs, though they were included in the database compiled by GAI and transmitted to Neptune and Company. The bulk of the sediment data for the Background Report (21 samples) were collected from the active channel, with an additional six samples from tributaries and a single overbank sample. The pros and cons of incorporating these data in the Phase I HHRA will be considered for the Draft Final Phase I HHRA report.

Specific Comment 12.

Section 3.5.1 (page 75). Please provide an explanation of the data qualifiers included in the dataset, in particular the non-standard data qualifiers (i.e., oUoU, UIUJ, etc.).

NMED Response. GAI developed the qualifier nomenclature for the Phase I RI data. A full description can be obtained from the RI Report (GAI, 2000). A brief description will be included in the Draft Final Phase I HHRA report as follows:

Sediment was screened and measured at several mutually exclusive particle size fractions. – <63 µm, 63-250 µm, and 250-2000 µm. However, for the RI data analysis and risk assessment, the particle size fractions <63 µm, <250 µm, and <2000 µm are employed. The latter two were calculated for a given sample using the weighted average approach described in Section 3.5.1.1. To be transparent, the qualifiers for the weighted averages need to convey the qualifiers for all measurements used in computing the average. For example, if the <63 µm measurement had a U qualifier, the 63-250 µm measurement was a detect, and the 250-2000 µm measurement had a U qualifier, then the <250 µm measurement qualifier would be Uo and the <2000 µm measurement qualifier would be UooU. On the other hand, if the <63 µm measurement was a detect, the 63-250 µm measurement had a U qualifier, and the 250-2000 µm measurement had a J qualifier, then the <250 µm measurement qualifier would be oU and the <2000 µm measurement qualifier would be oUoJ.

Specific Comment 13.

Section 3.5.1 (pages 76 – 77). The report states that the most recent USEPA guidance and ProUCL recommendations were used to develop EPCs, but there is no reference to testing for gamma distributions. Were the datasets tested for the gamma distribution?

NMED Response.

A gamma distribution test was not performed. Nearly all datasets tested as either normal or lognormal with a small coefficient of variation, so the student's-t UCL was used. For datasets

testing neither normal nor lognormal, a nonparametric bootstrap approach was used as this appeared most appropriate after inspection of summary statistics and boxplots.

Specific Comment 14.

Section 3.5.1.2 (page 76). A rationale was provided regarding only using surface data, not subsurface data. The text on page 76 indicates that "combining subsurface samples with surface samples to increase sample size and decrease uncertainty is not justified for this assessment...because it would eliminate a physical exposure barrier". However, plant roots transcend the physical exposure barrier and thus EPCs would be more accurate if all the data were included. Please clarify.

NMED Response.

The integration of vertical soil concentration profiles by plant roots is addressed in the HHRA for the calculation of EPCs related to produce ingestion. Please see Section 3.6.4 of the HHRA.

Specific Comment 15.

Section 3.5.1.2 (page 77). Chino does not agree that a 95th percentile of the distribution for COPCs is a representative EPC for recreators or trespassers since their exposure is integrated over large areas. Chino recommends that the 95 UCL on the mean be used for EPCs for these receptors.

NMED Response.

The method for calculating EPCs as the 95% UCL on the mean is described in Section 3.5.1. A 95th percentile of the distribution of COPC concentrations is not employed in the HHRA. Additional detail to clarify the method will be provided in the Draft Final Phase I HHRA report. The following summary may be helpful:

A 95% UCL for the mean is the 95th percentile of the sampling distribution of the mean. For example,

$$\bar{X} + t_{n-1,0.95} \cdot \frac{s}{\sqrt{n}},$$

is the 95th percentile of a student's-*t* distribution with mean \bar{X} , standard deviation s/\sqrt{n} , and $n-1$ degrees of freedom, which is the sampling distribution of \bar{X} . As described in Section 3.5.1, the random variable of interest in the area-weighted case is

$$Y = p_{AC} X_{AC} + p_B X_B + p_{OB} X_{OB}$$

As given in Section 3.5.1, the CTE EPC (\bar{Y}) is estimated by

$$\bar{Y} = p_{AC} \bar{X}_{AC} + p_B \bar{X}_B + p_{OB} \bar{X}_{OB}.$$

A 95% UCL for \bar{Y} is the 95th percentile of the sampling distribution of \bar{Y} . Bootstrap estimates of \bar{X}_{AC} , \bar{X}_B , and \bar{X}_{OB} are obtained by simulation. A value of \bar{Y} is calculated for each of these bootstrap simulations, to provide many samples from the sampling distribution of \bar{Y} . The 95% UCL of \bar{Y} is then computed as the 95th percentile of the distribution of \bar{Y} . Note that this is an estimate of the mean concentration, not the 95th percentile of the distribution of concentrations.

Specific Comment 16.

Section 3.5.4.1 (page 79). The text indicates that the PEF model is applied only to overbank sediments within the HWCIU, but since the resident was not evaluated for overbank, do these values apply to trespassers/recreators?

NMED Response.

The relationship of geomorphic features and exposure pathways for the different exposure scenarios is summarized in Table 3-1. Trespasser and recreational scenarios both incorporate a dust inhalation exposure pathways related to overbank sediments. Note that the residential scenario for overbanks, like other scenarios where a chronic exposure area or source term may be limited to an individual bar or overbank, was evaluated in the Phase I HHRA. Instead of a forward risk calculation using an exposure point concentration, the evaluation consisted of comparing the Phase I data to risk-based criteria (see Attachment 1 to the HHRA).

Specific Comment 17

Section 3.5.4 (page 80). How appropriate is the application of a Q/C value for a square site to a linear feature such as the Hanover/Whitewater Creek system?

NMED Response.

EPA's Q/C value used in the calculation of wind-derived dust concentrations in ambient air are based on dispersion modeling for a square 30-acre source area. The Q/C value has been applied to one or more contiguous overbanks rather than to the entire Hanover/Whitewater Creek system in an exposure reach, which would constitute a much larger area. To the extent that the long axis of an overbank is oriented on an approximately north-south axis and winds are predominantly perpendicular to this axis (westerly winds), the Q/C term will be biased in a protective manner. However, pathway analysis indicates that protective biases in the modeling of wind-borne dust have a minimal impact on the results and conclusions of the Phase I HHRA.

Specific Comment 18.

Section 3.5.4.1 (page 80). Chino does not see the relevance of modeling inhalation exposure to dust from vehicular disturbance especially if the modeled dust concentrations do not correspond to HWCIU sediments. In addition, the values for W and VKT suggest extensive road traffic on a short unpaved road. Chino does not believe it is realistic that there will be 20 cars and 10 trucks traveling on an unpaved road approximately 380 yards long every day for 250 days per year. Chino requests this analysis be removed from the risk assessment.

NMED Response.

The EPA vehicle disturbance model used in the HHRA is a protectively-biased screening model and was applied using EPA default values for the parameters referenced in this comment. The risk-based criteria calculated in this manner were recognized in the HHRA as having an exceedingly high degree of protective bias and were qualified accordingly. Only for manganese were the risk-based criteria for the construction worker scenario determined to be of potential concern. As discussed in Sections 3.5.4.2 and 5.5.3 of the HHRA, default model values may be replaced with more realistic estimates or the entire model may be calibrated (or replaced) by applicable empirical data during refinement of the risk assessment.

Specific Comment 19

Section 3.5.5 (page 83). There appear to be conflicting statements which suggest the 95% prediction limit (95UPL) was or was not used to calculate EPCs. Please clarify.

NMED Response.

The discussion of the 95UPL value in Section 3.5.5 of the HHRA is specific to calculation of upper-bound EPCs in plant tissues using the soil-plant regression models applied in the HHRA. The upper-bound EPCs were calculated to provide information on the uncertainty in plant tissue concentrations related to the soil-plant regression models.

Specific Comment 20

Section 3.5.6 (page 86). The text indicates that "exposure point concentrations in poultry meat and eggs are modeled from the overbank sediment"; however, based on earlier sections, Neptune indicates that the resident is not being evaluated for overbanks due to lack of data. If the pathway is not being evaluated due to lack of data, then there is no need to include this section. Please clarify.

NMED Response.

As noted in the response to Comment 16, a distinction was made in the HHRA between exposure scenarios for which exposure point concentrations could be developed and those for which Phase I data were judged inadequate for such calculations. However, all scenario and pathways were evaluated through a combination of forward risk calculations and comparison of Phase I data to risk-based criteria. The technical approach for calculating exposure point concentrations was provided for all exposure media regardless of which approach was used in the Phase I HHRA.

Comment 21

Section 3.5.6 (page 86). It is noted that the 10% soil ingestion rate for the chicken is now justified by the use of the soil ingestion rate of the wild turkey (another galliform).

NMED Response

A value of 9.3%, based on a wild turkey, is used in the HHRA. This value is approximately the same as the value of 10% recommended by EPA in their 2005 risk assessment protocol for combustion facilities.

Comment 22

Section 3.5.7 (page 87). The use of a FracR of 1 (i.e., 100 percent) is overly

conservative. It is not reasonable to assume that cattle spend their entire foraging time in a given year on the overbanks. The fraction of time spent on the overbanks should be estimated like a site use factor, by dividing the overbanks acreage evaluated in the relevant exposure scenarios by the entire range over which cattle are grazed at the site.

NMED Response

As discussed in Section 3.5.7 of the HHRA, the overly protective nature of the screening value for $Frac_R$ is recognized. Site-specific information relating to this variable will be researched to refine this value for the Draft Final Phase I HHRA report.

Comment 23

Section 3.6.1 (page 90). The equations for intake are similar to the equations provided in the Phase I Risk Analysis (Neptune, 2004) for assessing risk/hazard for each pathway, except two additional factors have been added to the soil ingestion equation: B, relative bioavailability, and Fexp, fraction of exposure area covered by affected soil.

a. Chino agrees with the addition of these parameters in evaluating potential risk at the site, but recommends relative bioavailability less than 100 percent for the reasonable maximum exposure (RME) since 100 percent is a worst case value, not a reasonable maximum.

b. For example, in the Hurley Soils IU human health risk assessment, Gradient assumed 50 percent bioavailability for arsenic for both central tendency (CTE) and RME scenarios.

c. Additionally, while the Golder (2002) study for copper was based on methods to determine bioaccessibility, not bioavailability (a measure of amount of chemical absorbed into the bloodstream, not total solubility in the stomach), these values can be used as an approximation for bioavailability as long as it is caveated that they are biased high for bioavailability.

d. Thus, for the RME scenario, the maximum bioaccessibility determined by Golder (2002) could be used instead of defaulting to 100 percent for copper bioavailability.

NMED Response

The HWCUI Phase I risk assessment used the same bioavailability values for assessing soil ingestion exposure of lead and arsenic as were employed by Gradient. As discussed in Section 3.6.1 of the HHRA, the Hurley Soils copper bioaccessibility study results were used for the CTE, but not the RME, calculations. The rationale for this decision, which relates to uncertainty in the applicability of the bioaccessibility study results for Hurley Soils to the HWC sediments, is provided in Section 3.6.1.

Comment 24

Section 3.6.1 (pages 91 – 92). Chino notes that adult body weight (71.8 kilograms (kg)), averaging time (75 years), adult drinking water rate (2.3 liters per day (L/day)), and adult inhalation rate (0.63 meter cubed per hour (m³/hr)) are marginally different than values used historically in other risk assessments (70 kg, 70 years, 2 L/day, and 20 m³/day respectively).

a. As toxicity values based on body weight, lifespan, and inhalation rate conversions were also calculated based on these exposure parameters, Chino anticipates that the uncertainty associated with the use of these alternate values will be marginal. However, the uncertainties associated with using values that are inconsistent with the values used to adjust toxicity values in IRIS should be discussed.

b. For example, the arsenic oral cancer slope factor reported in IRIS and selected for use in this study is based on the range of maximum likelihood estimates of risk of skin cancer to a 70 kg person drinking 2 L of water per day. Given the use of alternate, non-standard exposure factors in this assessment, the toxicity assessment should document the uncertainties associated with using non-standard exposure factors that are different from the ones used to develop toxicity values in IRIS, the primary source for toxicity values in this assessment.

NMED Response.

Additional discussion relating to the use of exposure values and averaging times that differ from those employed in the derivation of some EPA toxicity values will be added to the Toxicity Assessment and Uncertainty Analysis of the Draft Final Phase I HHRA report.

Comment 25.

Section 3.6.1 (page 92). The use of a value of 400 milligrams per day (mg/day) to evaluate the child RME recreator is overly conservative.

a. Given that the RME child recreator scenario assumes that all soil ingestion activities are associated with IU sediments (p. 92), this scenario therefore assumes that each day, 400 mg of soil will be ingested within 2 hours spent on the IU.

b. The ingestion rate for soil for children under the resident scenario is 100 and 200 mg/day for the CTE and RME scenarios and these values are based on tracer studies which estimate the total amount of soil a child could be exposed to in any given day and thus assuming 400 mg/day for a recreator child who is also exposed throughout the day as a resident is overly conservative. The recreator should have an ingestion rate that is a fraction of the resident.

NMED Response

The text on pg 92 describing the application of the daily soil ingestion rates will be edited for clarity. The daily rates were in fact applied on a fractional basis depending on the scenario-specific exposure time as shown in Equation 2 in Section 3.6.1. Tables 3-24 and 3-25 tabulate the RME and CTE exposure variable values for the soil ingestion exposure route, respectively. The time-weighted child soil ingestion rates for the recreational scenario are 171 mg/day and 42.7 mg/day for the RME and CTE estimates, respectively.

The exposure scenarios applied in the HHRA are each assessed independently. It is not overly conservative to assess these scenarios independently (100% of exposure in each scenario) because potential health effects from identical pathways have not been summed across scenarios in the HHRA. For example, the HHRA does not sum soil ingestion risks for an individual receptor from recreational and residential exposures.

Comment 26

Section 3.6.3 (page 95). The HHRA should cite the latest version of RAGS, Part E, for dermal exposure values. RAGS, Part E was finalized in 2004.

NMED Response

~~The citation will be corrected for the Draft Final Phase I HHRA report. The 2004 version of RAGS Part E was the document used for the HHRA.~~

Comment 27

Sections 3.6.4, 3.6.5, 3.6.6 (pages 96 – 100). The HHRA indicates that estimated concentrations in fruits and vegetables will be corrected using a dry-weight-to wet-weight conversion factor, since ingestion rates are provided in wet weight. No information is provided regarding whether a conversion factor was needed to adjust either estimated concentrations in chicken, eggs, or beef or ingestion rates of these food items.

NMED Response

The transfer factors for beef, chicken, and eggs are reported as wet-weight tissue values per intake rate (mg/kg wet tissue per mg/day). No conversion factors are required when using them in conjunction with the wet-weight ingestion data. This will be noted in the Draft Final Phase I HHRA report.

Comment 28

Sections 3.6.4, 3.6.5, 3.6.6 (pages 96 – 100). The HHRA does not include a bioavailability or bioaccessibility factor in the ingestion of fruits/vegetables, chicken, eggs, or beef pathways, although such a factor was included in the soil ingestion equation.

NMED Response

100% bioavailability of metals in foodstuffs was assumed. This will be noted in the Draft Final Phase I HHRA report.

If you require additional information or have any questions, please do not hesitate to call me at (505) 827-1046.

Sincerely,



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